

# GASTROPODS FROM THE BURDEKIN FORMATION, MIDDLE DEVONIAN, NORTH QUEENSLAND

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Twenty one taxa of gastropods are described from the Middle Devonian Burdekin Formation, north Queensland. New amongst these are *Burdekinostoma burdekinensis* gen. et. sp. nov., *Euryzone burdekinensis* sp. nov., *Anomphalus pajelli* sp. nov., *Didymalgia bartholomai* gen. et sp. nov., *Murchisonia (Murchisonia) jackjelli* sp. nov., *Palaeozygopleura machenryi* sp. nov., and *Trinema heideckeri* gen. et sp. nov. The fauna contains typical Old World Realm genera but is specifically strongly endemic. □ *Gastropods, Devonian, Queensland, Burdekin Formation.*

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Burdekin Formation is a shallow marine carbonate sequence exposed within the Burdekin Subprovince (Wyatt & Jell, 1967; Henderson, 1980; ). The formation consists of, inter alia, a reefal and biostromal complex, with associated lagoonal, inter-reef and offshore facies (Cook, 1995). It contains diverse fossil assemblages which include rugose corals (Zhen 1991, 1994), tabulate corals, stromatoporoids (Cook, 1994), sponges, molluscs (Cook, 1993a) and conodonts (Talent & Mawson, 1994). Large, thick-shelled gastropods from the underlying and interdigitating, siliciclastic-dominated, Big Bend Arkose and basal units of the Burdekin Formation are *Burdikinia burdekinensis* (Etheridge, 1917), *Amphelissa carinatum* (Heidecker, 1959), *Labrocuspis nodosa* Heidecker, 1959, and *Fleischerviewia septata* Cook, 1993b.

This paper is concerned with a diverse gastropod faunule from a stratigraphically higher unit in the Burdekin Formation in coralline packstones interpreted to represent shallow-water coralline thickets seaward of a biohermal structure (Cook, 1995). The fauna has been silicified and was recovered by bulk dissolution in acetic acid. Both large and small gastropods were retrieved, in addition to corals, brachiopods and bivalves. All material comes from QML1094, near Little Rocks, 27km NW of Charters Towers.

## SYSTEMATIC PALAEOLOGY

Phylum MOLLUSCA  
Class GASTROPODA  
Order ARCHAEOGASTROPODA  
Superfamily BELLEROPHONTOIDEA  
Family BELLEROPHONTIDAE McCoy, 1851  
Subfamily TROPIDODISCINAE Knight, 1956

**Tropidodiscus** Meek & Worthen, 1866  
**Tropidodiscus** sp.  
(Fig. 1A-C)

MATERIAL EXAMINED QMF35513, QMF35514.

DESCRIPTION. Shell minute, approximately 2.5mm in diameter, 0.8mm wide; involute with moderately wide umbilicus. Whorl profile sharply angular, without obvious crest. Relics of fine, numerous growth lines present.

**Bellerophon** de Montfort, 1810

*Bellerophon (Bellerophon)* de Montfort, 1810

**Bellerophon (Bellerophon)** sp. A  
(Fig. 1D,E)

MATERIAL EXAMINED. QMF34916, QMF34962.

DESCRIPTION. Small to medium-sized, spherical, involute, 5.5mm wide; narrow deep umbilicus. Whorl profile evenly rounded; margin bearing weak crest. Aperture unknown. Ornament consists of many fine growth lines.

REMARKS. The few specimens possess similar characteristics to the type, *B.(B.) vasulites* de Montfort, 1810 from the Middle Devonian of

Germany as figured by Knight (1941). The numerous growth lines and overall form are similar, but the Burdekin form is much smaller (Knight, 1941: pl. 11) and the selenizone-bearing crest is weaker, possibly due to imperfect silicification.

**Bellerophon (Bellerophon) sp. B**  
(Fig. 1F,G)

MATERIAL EXAMINED. QMF34908.

DESCRIPTION. Spherical, medium-sized, approximately 10mm in diameter, 9mm high; involute with deep, wide umbilicus. Whorl profile wide and rounded with weak crest; slight flattening of inner whorl surface adjacent to penultimate whorl, extending approximately one third across the inner whorl profile.

REMARKS. The specimen is larger and has a wider whorl profile than *Bellerophon (Bellerophon)* sp. A, which is a result of the flattened area on the whorl profile abutting the penultimate whorl.

Superfamily EUOMPHALOIDEA  
de Koninck, 1881  
Family EUOMPHALIDAE de Koninck, 1881

**Straparollus** de Montfort, 1810  
**Straparollus (Euomphalus)** Sowerby 1814

**Straparollus (Euomphalus) sp.**  
(Fig. 1Q)

MATERIAL EXAMINED. QMF34965.

DESCRIPTION. Medium-sized, planispiral, 21.4mm wide, 8.2mm high. Suture in a channel. Whorl profile square with prominent angulation above and below gently convex midwhorl surface. Weak spiral line adumbilically to the upper angulation which may mark the position of the sinus. Aperture rounded, but quadrate. Base flattened.

**Straparollus (Serpulospira)** Cossman, 1916  
**Straparollus (Serpulospira) sp.**  
(Fig. 1R)

MATERIAL EXAMINED. QMF34966.

DESCRIPTION. Shell planispiral, disjunct, 13.6mm wide, 4.6mm high. Whorl profile rounded, aperture rounded. No growth lines preserved.

Suborder PLEUROTOMARIINA  
Cox & Knight, 1960  
Superfamily PLEUROTOMARIOIDEA  
Swainson, 1840  
Family RAPHIOSTOMATIDAE Koken, 1986  
Subfamily OPHILETINAE Knight, 1956

**Burdekinostoma** gen. nov.

TYPE SPECIES. *Burdekinostoma burdekinensis* sp. nov.

ETYMOLOGY. For the Burdekin River, and alluding to the Raphiostomatidae.

DIAGNOSIS. Minute, low-spined to lenticular, gradate shell, widely phaneromphalous, having a commonly channeled suture and prominent, gently inclined, flattened area on the upper whorl surface bordered by 2 strong cords, inferred to contain the selenizone and also commonly containing weak threads; midwhorl profile generally subrounded but stepped with several cords.

REMARKS. Placement of this striking if minute genus is difficult, as it superficially resembles members of the Ophiletinae, Raphiosomatinae and Euomphalidae. Placement depends on the interpretation of the inclined surface on the upper whorl face, which is inferred to contain the selenizone. In particular the raphiostomine *Wisconsinella* Blodgett (1988) from the Eifelian of North America is a similar taxon to the Burdekin material, sharing the gradate shell form, but lacking the additional cords and the channeled suture. Placement within the Raphiostominae is restricted by the widely phaneromphalous nature of this snail. Alternatively the channeled suture may be interpreted as containing a sinus, which would ally the genus to the Euomphalidae, of which *Poleumita* Clarke & Ruedemann and *Cenitifugus* Bronn are similar cord-bearing forms. Neither of these placements is satisfactory. Placement in the Ophiletinae best satisfies the interpretation of the selenizone, accommodates the channelled suture and the phaneromphalous condition.

**Burdekinostoma burdekinensis** sp. nov.  
(Fig. 2J-P)

MATERIAL EXAMINED. HOLOTYPE: QMF34961.  
PARATYPES: QMF35522-QMF35530.

ETYMOLOGY. From the Burdekin River.

DIAGNOSIS. As for genus.

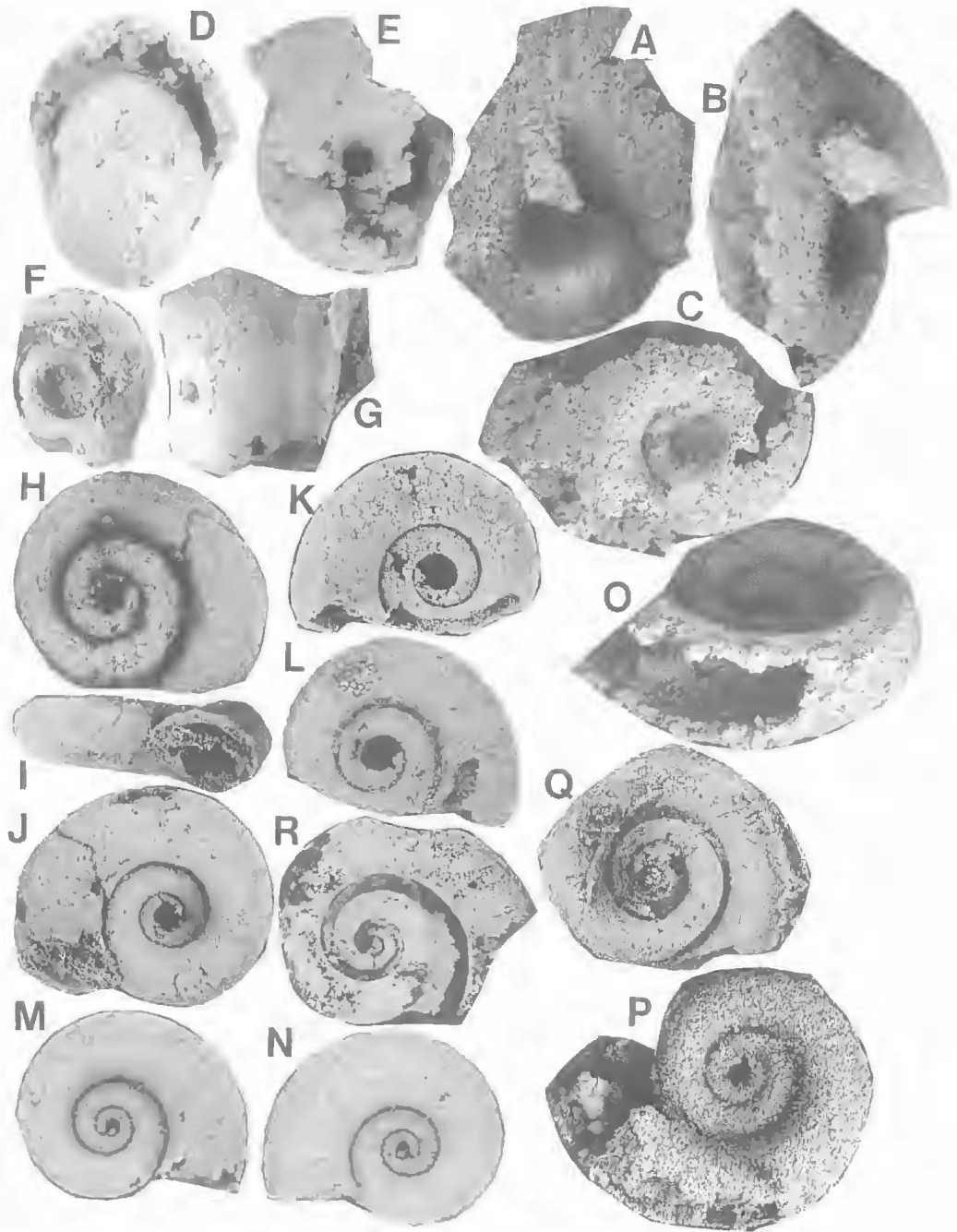


FIG. 1. A-C. *Tropidodiscus* sp. SEM images. A, B, QMF35512, side and oblique views respectively, x 16; C, QMF35513, side view, x 16. D-E. *Bellerophon* (*Bellerophon*) sp. A, QMF34916, apertural and side views respectively. F, G. *Bellerophon* (*Bellerophon*) sp. B, QMF34908, side and broken apertural views respectively. H-P. *Euryzone burdekinensis* sp. nov. H-J, Holotype QMF34917, apical, apertural and basal views respectively, x 4.4; K, L, Paratype QMF 34969, basal and apical views, x 3.2; M, N, Paratype QMF34964 apical and basal views x 6.3; O, Paratype, QMF35536 oblique side view, x 22.5, SEM image; P, Paratype QMF35536 apical view x 22.5, SEM image. Q. *Straparollus* (*Euomphalus*) sp. QMF34965 apical view, x 1.8. R, *Straparollus* (*Serpulospira*) sp. QMF34966, apical view x 2.3.

**DESCRIPTION.** Shell small to minute, less than 4.5mm wide and 1.5mm high, very low-spired, somewhat gradate, widely phanerocephalous, with deep umbilicus. Whorl profile series of angular surfaces but giving an overall rounded profile. Suture with adjacent, wide channel. Upper whorl face bears numerous spiral threads, of at least 2 orders of intensity. Three prominent threads on smaller specimens; bordering the sutural channel, another high on the whorl profile and another at the edge of the upper whorl face giving way to the steeper midwhorl surfaces, the last 2 inferred to contain the selenizone. At least 2 threads on the midwhorl, creating a vertical surface at the midwhorl periphery; at least 3 revolving cords on the lower whorl face. The upper whorl face bears up to 7 minor spiral threads, in addition to the major cords.

**REMARKS.** This striking taxon is easily differentiated by *Euryzone burdekinensis* sp. nov. by the numerous spiral threads and more angular whorl profile.

Family GOSSELETINIDAE Wenz, 1938  
Subfamily COELOZONINAE Knight, 1956

*Euryzone* Koken, 1896  
*Euryzone burdekinensis* sp. nov.  
(Fig. 1H-P)

**MATERIAL EXAMINED.** HOLOTYPE: QMF34917. PARATYPES: QMF34918-QMF34927, QMF34964, QMF34969.

**DIAGNOSIS.** Small to minute member of genus with sinus on upper whorl profile bounded by fine threads.

**DESCRIPTION.** Shell discoidal, minute to small, up to 11.9mm wide, 3.6mm high, generally smaller (Table 1). Whorls abut, with impressed suture. Base with moderately deep umbilicus. Whorl profile rounded, bearing two fine cords which border the sinus. Growth lines fine, numerous. Shell repair in evidence on holotype.

**REMARKS.** The species is characterised by its discoidal shape and the striking presence of the sinus on the upper whorl face and its bordering cords. The most similar member of the genus to the Burdekin material is *Euryzone petitiornata* Linsley 1968 from the Middle Devonian Anderson Limestone, Michigan, but its selenizone is slightly lower on the whorl profile, and it is a less planispiral than the Burdekin species. The type species *E. delphinuloides* (Schothheim) from

TABLE 1. Measurements for *Euryzone burdekinensis* sp. nov.

Specimen	Height (mm)	Width (mm)
Holotype	3.6	10.9
QMF34969	3.6	10.0
QMF34964	2.0	4.8
QMF34915	3.1	7.3
QMF34921	1.6	5.0

the Middle Devonian *Stringocephalus* Limestone, Germany, has a turbiniform shell and a wider selenizone.

Suborder TROCHINA Cox & Knight, 1960  
Superfamily ANOMPHALOIDEA Wenz, 1938  
Family ANOMPHALIDAE Wenz, 1938

*Anomphalus* Meek & Worthen, 1867

**TYPE SPECIES.** *Anomphalus rotulus* from the Middle Pennsylvanian, St Davids Limestone, Illinois, USA, by original designation.

*Anomphalus pajelli* sp. nov.  
(Fig. 2A-J)

**MATERIAL EXAMINED.** HOLOTYPE: QMF34850. PARATYPES: QMF34851-QMF34858.

**ETYMOLOGY.** For Peter A. Jell.

**DIAGNOSIS.** Smooth-shelled, medium-sized member of genus with very weak sutures and prominent thickening of inner lip which creates a hemiomphalus base.

**DESCRIPTION.** Medium-sized, low-spired, rotelliform hemiomphalus gastropod, up to 11.5 mm high, 13.5 mm wide (Table 2). Sutures flush, commonly difficult to detect, whorls embrace high on upper whorl surface. Umbilicus narrow obscured or occluded by thickening at the inner labrum, otherwise base rounded. Whorl profile rounded with periphery at midwhorl. Aperture rounded. Shell thick, inner labrum particularly thickened forming partial umbilical plug. Shell smooth, very faint growth lines on the base of QMF34851. There is some variation in the taxon with respect to where the whorls embrace. On QMF34851 the whorls embrace further down the whorl face, producing a slightly more naticiform shell shape. Despite silica replacement the smooth shell has an almost polished appearance on some specimens.

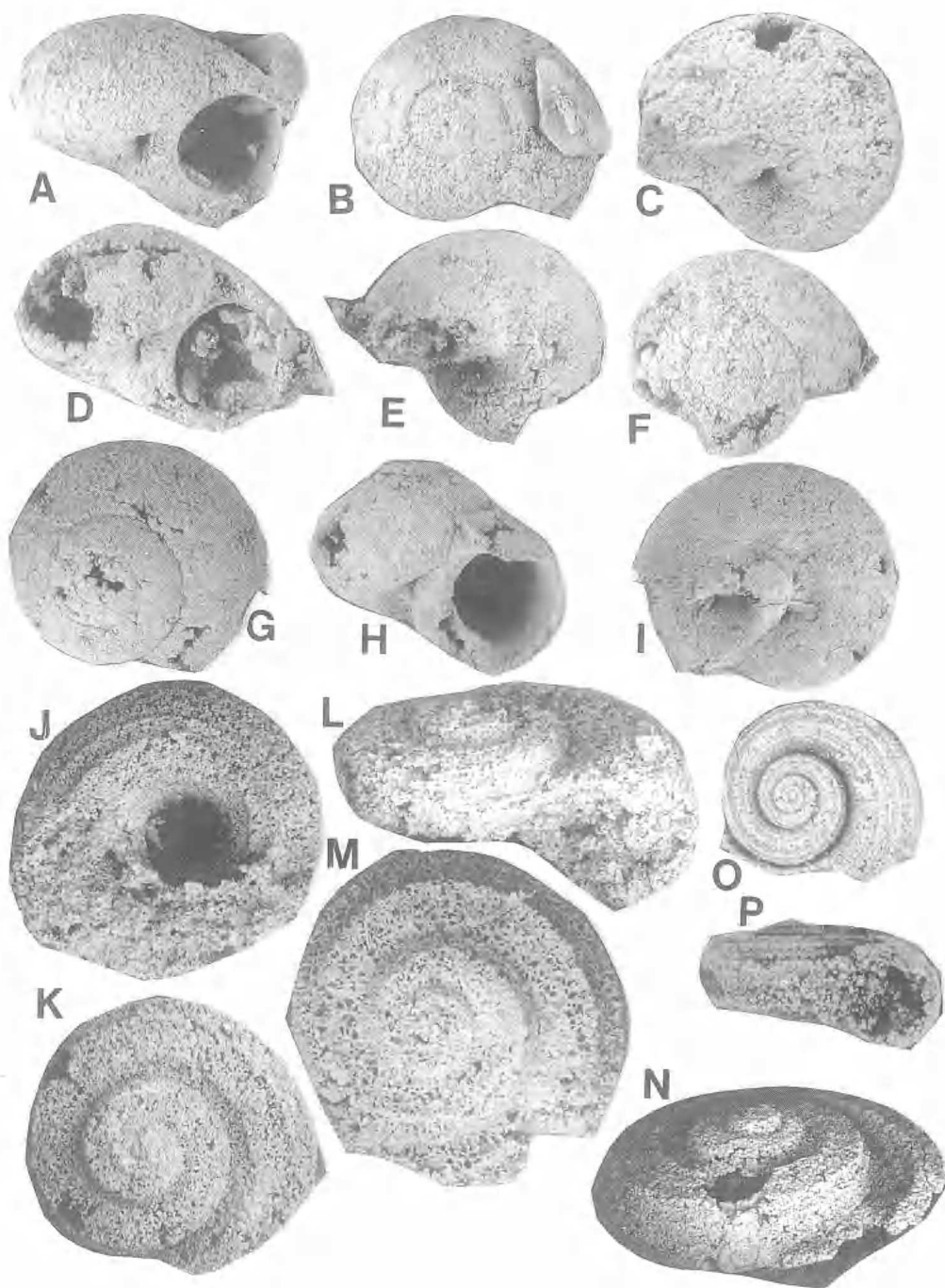


FIG. 2. A-I, *Anomphalus pajelli* sp. nov. A-C, Holotype QMF34850, apertural, apical and basal views, x 9. D-F, Paratype QMF34852, apertural, basal and apical views, x 2.2. G-I, Paratype QMF34851 apical, apertural and basal views, x 2.5. J-P, *Burdekinostoma burdekinensis* gen. et sp. nov. J,K, Paratype QMF35523, basal and apical views, SEM images, x13.5; L,M, Paratype QMF35522, oblique apertural and apical views, SEM images, x 15; N, QMF 35525 side view, x 13.5; O,P, Holotype QMF34961, x 5.4, apical and side views respectively.

TABLE 2. Measurements for *Anomphalus pajelli* sp. nov.

Specimen	Height (mm)	Width (mm)
QMF34850	10.7	13.1
QMF34851	11.5	13.5
QMF34852	7.8	13.1
QMF34853	7.8	11.1

REMARKS. Both Knight (1941) and Knight et al. (1960) noted the variable umbilicus in this genus. The Burdekin material is assigned to the genus on the basis of gross shape, lack of ornament and the hemiophalus condition. The type species *A. rotulus* Meek & Worthen as figured by Knight (1941) has a slightly lower whorl profile and more prominently incised sutures. *Anomphalus umbilicoliratus* Batten (1966) from the Lower Carboniferous Hotwells Limestone, England is clearly phaneromphalous and has spiral ornament on the base. *Anomphalus helicinaeformis* (Schlotheim) from the Middle Devonian *Stringocephalus* Limestones near Gladbach, Germany has a fully developed umbilical plug (see Knight 1941: pl 63), but in overall aspect is most similar to the Burdekin species, and is closely related. Specimens illustrated by Knight (1941) show minor variation in spire height for *A. helicinaeformis* (Schlotheim). *Naticopsis margheriti* Mansuy (1912), may also be an *Anomphalus*; albeit with a slightly more naticiform shell.

Suborder NERITOPSINAE Cox & Knight, 1960  
 Superfamily NERITOIDEA Rafinesque, 1815  
 Family NERITOPSIDAE Gray, 1847

*Naticopsis* M'Coy, 1844

*Naticopsis* (*Naticopsis*) sp.  
 (Fig. 4A)

MATERIAL EXAMINED. QMF34913.

DESCRIPTION. Very small, 4.9mm wide, 5mm high, naticiform, anomphalous; suture adpressed to slightly impressed; whorl profile rounded, with periphery well above midwhorl. Upper whorl surface flatter than lower whorl face. Final whorl dominated by strong collabral cords, increasing in intensity towards the aperture. Early whorls lack this ornament. Parietal and inner lip heavily thickened; aperture ovate. Base rounded.

REMARKS. The specimen strongly resembles *Natica nexicosta* (Phillips) of Whidborne (1892),

from the Middle Devonian at Lummaton, England, but the latter possesses strong collabral cords on early whorls. *Naticopsis* (?*Naticopsis*) sp. (Rollins, Eldridge & Spiller, 1971), from the Middle Devonian Marcellus Formation, New-York, shows a similar ornament, but the threads are fine and inclined on the whorl face. *Straparollus corrugatus* (Stauffer, 1909), which Linsley (1968) placed within ?*Isonema*, and Rollins, Eldridge & Spiller (1971) assigned to *Naticopsis* (*Naticopsis*), from the Middle Devonian of Ohio also shows strong collabral ornament, but not restricted to the mature whorls. ?*Isonema corrugatus* (Stauffer) from the Middle Devonian Anderdon Limestone (Linsley, 1968) is a minutely illustrated taxon. Linsley (1968) describes the early whorls as smooth suggesting affinity to the Burdekin specimen. Positive generic identification of Linsley's taxon is impossible without viewing his material. I place *Natica nexicosta* (Phillips) of Whidborne and *Straparollus corrugatus* Stauffer both within *Naticopsis* (*Naticopsis*) alongside this distinct, if poorly preserved and unresolved, taxon from the Burdekin Formation.

Superfamily ORIOSTOMATOIDEA Wenz, 1938  
 Family ORIOSTOMATIDAE Wenz, 1938

*Didymalgia* gen. nov.

TYPE SPECIES. *Didymalgia bartholomai* sp. nov.

ETYMOLOGY. For 'Didymalgia' hill, informal name of laterite profile near the Fletcherview locality.

*Didymalgia bartholomai* gen. et sp. nov.  
 (Fig. 3)

MATERIAL EXAMINED. HOLOTYPE: QMF34896.  
 PARATYPES: QMF34876-QMF34895, QMF34915.

ETYMOLOGY. For Alan Bartholomai.

DIAGNOSIS. Turbiniform, widely phaneromphalous shell with numerous revolving cords and strong comarginal cords forming and cancellate structure, whorl profile angular, formed by series of inclined surfaces.

DESCRIPTION. Medium-sized, turbiniform, widely phaneromphalous shell, up to 9.5mm high and 11.1mm wide (Table 3). Whorl face adorned with strong revolving cords and slightly less strong comarginal ribs, producing a cancellate shell decoration. Whorl profile series of angular surfaces with a subsutural shelf, steeply inclined upper whorl face, angular periphery,

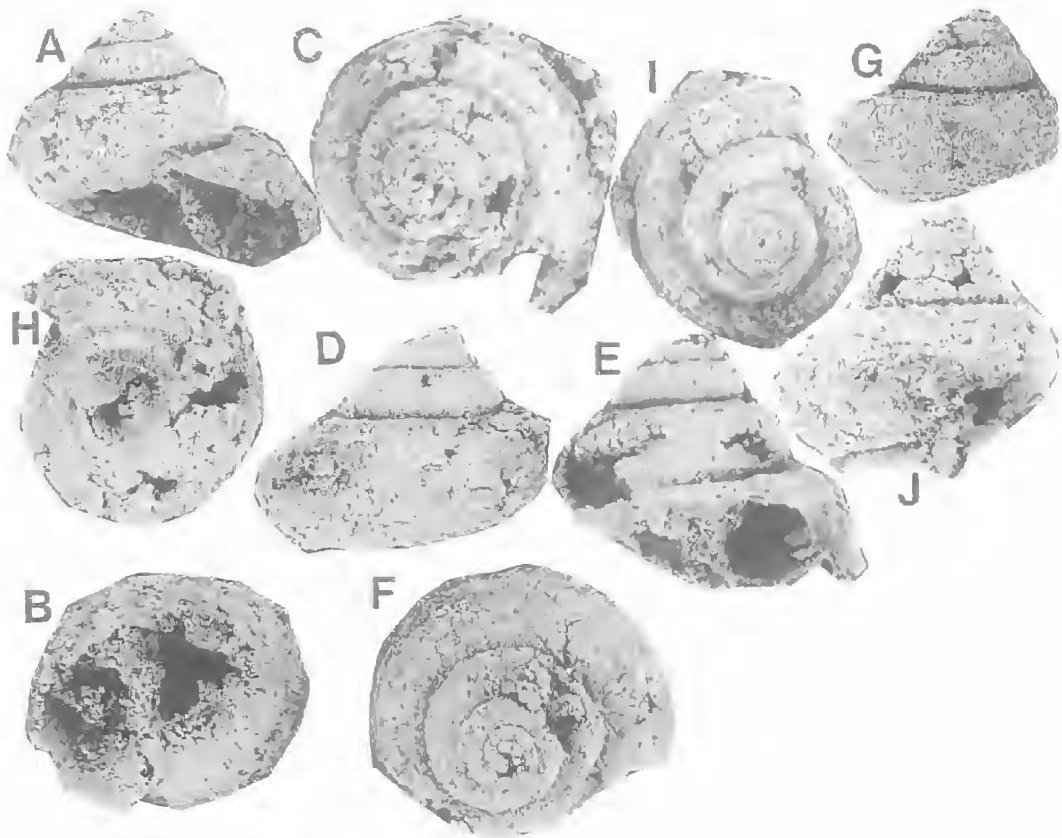


FIG. 3. *Didymalgia bartholomai* gen. et sp. nov. A-D, Holotype QMF34896, x 3 apertural, basal (x 2.8), apical and side views (x 2.8). E-G, Paratype QMF34875. E, apertural view x 5; F, apical views x 5; G, side view x 4. I, J, Paratypes QMF34876, x 3 apical and side views.

inclined lower surface leading to the phaneromphalous base, sutures embrace just below periphery which is situated slightly below mid-whorl. Slight subsutural shelf, 4 major revolving cords on the upper whorl face, a major cord at the periphery, and 7 to 8 cords on the lower whorl face and base. Two orders of cords on the lower whorl face. Aperture rounded to subrounded, slightly wider than high. Thick colabral cords are numerous almost orthoeline, and are not deflected by a sinus or selenizone.

**REMARKS.** *Oriostoma* sp. aff *O. gerbaulii* Oehlert of Blodgett & Johnson (1992) from the Eifelian of Nevada is grossly similar to the Burdekin material but has a channeled subsutural zone. *Gyronema multinodosa* Blodgett & Johnson from the Eifelian of Nevada, which could be accommodated in *Kitikamispira*, has fewer cords and more prominent nodes on the shell surface. Placement of the genus within the Ori-

ostomatidae is problematic, in that it extends the range of the family beyond their supposed Eifelian demise (Blodgett et al. 1990), but the strong ornament, lack of selenizone on the whorl face and trochiform, phaneromphalus shell form make the placement appropriate, if controversial.

TABLE 3. Data for *Didymalgia bartholomai* gen. et sp. nov.

Specimen	Height (mm)	width (mm)
QMF34896	9.5	11.1
QMF34876	8.8	8.8
QMF34875	7.2	8.4

Suborder MURCHISONIINA Cox & Knight, 1960  
 Superfamily MURCHISONIOIDEA Koken, 1896  
 Family MURCHISONIIDAE KOKEN, 1896

*Murchisonia* d'Archaic & de Verneuil 1841

*Murchisonia* (*Murchisonia*) *jackjelli* sp. nov.  
 (Fig. 4B-H)

MATERIAL EXAMINED. HOLOTYPE: QMF34905.  
 PARATYPES: QMF34897-QMF34900, QMF34902,  
 QMF34903, QMF34929, QMF34932, QMF34933,  
 QMF34935-QMF34940, QMF34942-QMF34943,  
 QMF34946-QMF34948, QMF34952-QMF34953.

ETYMOLOGY. For J.S. Jell.

DIAGNOSIS. Medium-sized member of subgenus with a relatively wide selenizone, subrounded whorl profile and up to 5 threads on the adult lower whorl surface.

DESCRIPTION. Medium-sized to large, high-spired shell, up to 41.5mm long and 11.6mm wide at base. Suture impressed, whorls embrace at approximately lower one third of the whorl height. Whorl profile subrounded but with 2 weak peripheral cords bordering a wide selenizone. Up to 5 additional weaker spiral threads on the lower whorl face with 2 extremely faint threads on the upper surface. In juvenile specimens cords bordering the selenizone are stronger on early whorls, and the lower whorl face lacks the multiple threads of the adult whorls, instead 1 or 2 threads are more prominent. Aperture ovate with minor thickening of the inner lip.

REMARKS. Poor preservation of the material significantly impedes the study of this species. Clearly the presence of the wide midwhorl selenizone denotes the subgenus, and the numerous weak threads on adult whorls distinguish a new taxon. The width of the selenizone and the numerous threads may suggest Carboniferous *Stegocoelia*, but the selenizone is at the periphery negating that assignment. In the Middle Devonian *Murchisonia* (*Murchisonia*) underwent significant radiation into a multitude of unusual shell forms (Knight et al. 1960; Blodgett et al., 1990) and the included species described to date are numerous (e.g., Whidborne, 1892). Taxa with similar multiple threads on the whorl face are *M. (M.) vicariana* Whidborne, *M. (M.) loxonemoides* Whidborne, both from the Middle Devonian of Southern England, but the former has nodose threads and the latter a thinner, lower set selenizone.

*Murchisonia* (*Murchisonia*) sp. A.  
 (Fig. 4I-J)

MATERIAL EXAMINED. QMF34930.

DESCRIPTION. Small, 10.5mm high, 5.3mm wide, high-spired, with eight whorls present. Suture strongly impressed, whorls embrace well below midwhorl; angular whorl profile with 2 prominent spiral cords bordering a selenizone. Other decoration not preserved.

REMARKS. A selenizone on the midwhorl, bordered by 2 cords is the classic *murchisonioid* condition and the specimen is here allocated to the subgenus on this basis. The species resembles *M. (M.) fermioni* Tassell, 1982, from the Emsian of New South Wales, and also known from the Givetian in the Broken River Province, but the material is too poorly preserved to be confident of any specific assignment.

*Murchisonia* (*Murchisonia*) sp. B.  
 (Fig. 4K)

MATERIAL EXAMINED. QMF35520.

DESCRIPTION. Shell small, 6mm high, 2mm basal width, high-spired, with 7 whorls present. Sutures impressed, whorls embrace just below periphery. Whorl profile angular with 2 strong cords bordering a selenizone at the periphery, the upper cord slightly stronger. Upper whorl face gently sloped with a weak spiral cord close to the main ornament on the margin. Lower whorl profile obscured, aperture and base unknown.

REMARKS. The bordered selenizone identifies the subgenus. It is higher-spired than *Murchisonia* (*Murchisonia*) sp. A. and has a significantly different whorl profile than *Murchisonia* (*Murchisonia*) *jackjelli* sp. nov.

Superfamily CRASPEDOSTOMIDOIDEA  
 Wenz, 1938  
 Family CODONOCHEILIDAE Miller, 1889

*Mitchellia* de Koninck, 1876

?*Mitchellia* sp.  
 (Fig. 4L,M)

MATERIAL EXAMINED. QMF35515, QMF35516.

DESCRIPTION. Two fragmental specimens, neither of which have a gerontic stage or aperture preserved. Small high-spired gastropod with impressed suture; whorls embrace just below mid-



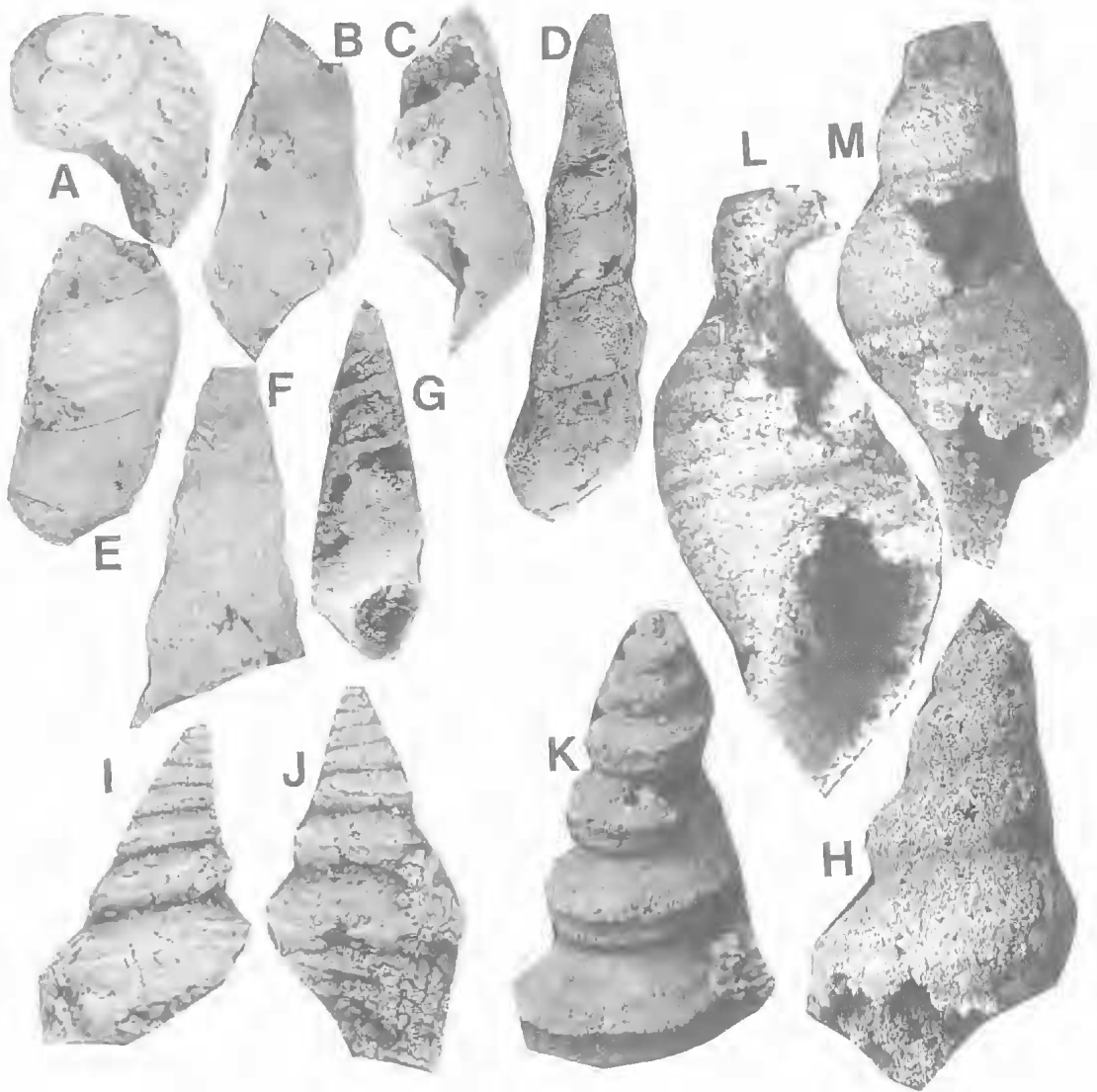


FIG. 4. A, *Naticopsis (Naticopsis)* sp. QMF34913, oblique apical view, x 5. B-H, *Murchisonia (Murchisonia) jackjelli* sp. nov. B, C, Holotype QMF34905, side views x 2.8; D, Paratype QMF34900, side view x 1.5; E, Paratype QMF34897, side view x 2; F, Paratype QMF34903, side view x 2.6; G, Paratype QMF34899 apertural view x 1.6; H, Paratype QMF35520, side view x 12. I, J, *Murchisonia (Murchisonia)* sp. A. QMF34930, x 3.5. I, side view; J, apertural view. K *Murchisonia (Murchisonia)* sp. B. side view x 10. L, M, ?*Mitchellia* sp. L, QMF35515, x 20; M, QMF35516 x 20.

whorl. Whorl profile rounded, face bearing numerous, (up to 10) spiral threads of equal intensity. Aperture not preserved, but inner whorl profile ovate with long axis vertical.

REMARKS. Generic assignment is impossible without more material, but the material is questionably assigned to the common eastern Austra-

lian Emsian genus on the basis of gross shell shape. It lacks the characteristic aperture needed for more definite assignment to the taxon.

Order CAENOGASTROPODA Cox, 1959  
 Superfamily LOXONOMATOIDEA Koken, 1889  
 Family PALAEOZYGOPLURIDAE Homy 1955

**Palaeozygopleura** Horny, 1955

**Palaeozygopleura machenryi** sp. nov.  
 (Fig. 5A-F)

MATERIAL EXAMINED. HOLOTYPE: QMF35531.  
 PARATYPES: QMF35532-QMF35525, QMF35539.

ETYMOLOGY. For Colin McHenry.

DIAGNOSIS. Small to minute member of genus with moderately impressed suture and only slightly sigmoidal ribs.

DESCRIPTION. Shell high-spired, many whorled, up to 8 present, up to 4mm long and 1.6mm wide. Sutures impressed, whorls embrace well below midwhorl; whorl profile rounded. Periphery at midwhorl. Whorl face bears many slightly sigmoidal ribs, obvious on all adult whorls. Protoconch poorly preserved, but smooth and dextral.

REMARKS. The material is most similar to *P. joanni* Linsley from the Middle Devonian Anderson Limestone of Michigan, but in the Burdekin species the ribs are less numerous and the suture less impressed. It differs from the single specimen *Palaeozygopleura* sp. described below by the more impressed sutures and coarser ornament.

**Palaeozygopleura** sp.  
 (Fig. 5G)

MATERIAL EXAMINED. QMF35519.

DESCRIPTION. Minute, 3.6mm high, 1.5mm wide, high-spired, nearly pupiform with shallowly impressed suture, gently rounded whorl profile. Ornament consists of fine, procline threads on the whorl surface.

REMARKS. The single specimen has weaker sutures than *P. machenryi* sp. nov. and finer procline ornament.

Family TURRITELLIDAE Woodward, 1851

**Trinema** gen. nov.

TYPE SPECIES. *Trinema heideckeri* sp. nov. from the Middle Devonian Burdekin Formation, north Queensland.

ETYMOLOGY. Tri-, three, nema (Greek) thread.

DIAGNOSIS. Small to medium-sized, anomphalous, high-spired, many whorled shell; whorl profile rounded, bearing three prominent midwhorl cords. Suture impressed; a subsutural surface is bounded below by a weak thread which forms the upper limit of the deep sinus, in turn bounded below by the highest of the three midwhorl cords. Finer threads are present on the lower whorl face. Growth lines are procline above the sinus and opisthocline below. Whorls embrace just below the higher of the weak threads on the lower whorl face.

REMARKS. Placement in the family is indicated by the overall shell form and the position of the sinus above the midwhorl cords (see Knight et al. 1960: 1317). The taxon is differentiated by the only other Devonian turritellid (Linsley 1978), *Acanthonema* Sherzer & Grabau, 1908 by lacking the distinctive nodose cords. In the Late Carboniferous *Orthonema* Meek & Worthen, 1861 (see Knight 1934, 1941, Knight et al., 1960) there are 2 prominent midwhorl cords, widely separated below the similarly positioned sinus. In *Callispira* Nelson, 1947, the sinus is also positioned high on the whorl face, but the whorl face is less rounded and there are many more stronger cords (5-6) on the whorl face. There is a considerable gap in the taxonomic record of the Turritellidae between the appearance of *Acanthonema* in the Early Devonian (Sherzer & Grabau, 1908), their Middle Devonian record (herein) and the numerous Carboniferous records of *Orthonema* (Knight, 1934). Such a discontinuity in the record may be resolved by analysis of Late Devonian age faunas.

**Trinema heideckeri** sp. nov.  
 (Fig. 5H-K)

MATERIAL EXAMINED. HOLOTYPE: QMF34954.  
 PARATYPES: QMF34941, QMF34945, QMF34955.

DIAGNOSIS. As for genus.

DESCRIPTION. Material somewhat fragmental, Shell small- to medium-sized, anomphalous, high-spired, up to 12 whorls present. Whorl profile rounded overall, slightly more convex on lower whorl face; periphery at midwhorl. Suture impressed with subsutural face bordered below by weak spiral thread. Midwhorl face dominated by 3 strong spiral cords the middle of which is slightly weaker. Between the uppermost of the strong peripheral cords and the weak cord below

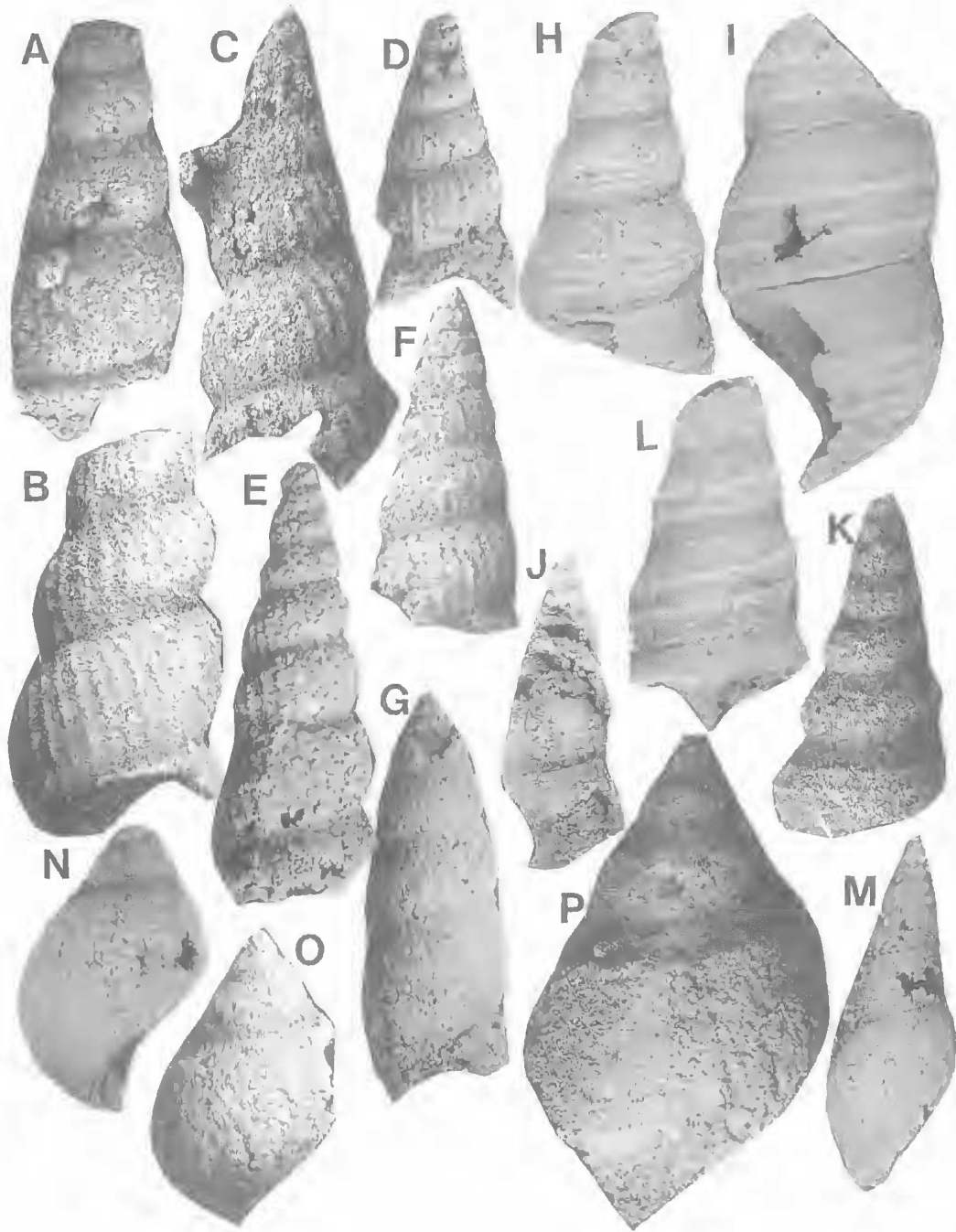


FIG. 5. A-F. *Palaeozygopleura machenryi* sp. nov., all SEM images. A, Paratype QMF35532, x 19; B, QMF35533 x 17; C, QMF35534, x 21; D, QMF35535, x 19; E, QMF35538, x 15; F, Holotype QMF35531, x 17. G. *Palaeozygopleura* sp. QMF35519, x 15. H-K. *Trinema heideckeri* gen. et sp. nov. H, Paratype QMF34941, x 4.3; I, Holotype QMF34954, side view x 5; J, Paratype QMF34955, x 2.5; K, Paratype. L, Paratype QMF34945, small specimen, x 19 SEM image. L, *Trinema* sp. QMF34931, x 4.3. M, ?*Subulites* (*Subulites*) sp. QMF34934, x 4.2. N, ?*Subulites* (*Fusispira*) sp. A. QMF34912, x 6.1. O, P, ?*Subulites* (*Fusispira*) sp. B, QMF35517, x 9, x 17 respectively.

the suture lies the trace of the deep sinus, indicated by the growth lines. Three weak spiral cords are present on the lower whorl face. Growth lines fine, numerous, prosocline above the sinus and opisthocline below. Whorls embrace just below the uppermost fine thread on the lower whorl face.

REMARKS. *Trinema heideckeri* is superficially resemblant of *Murchisonia* species described below, but is clearly distinguished by the 3 mid-whorl cords and the placement of the sinus. *Trinema* sp. below is differentiated by the position of the suture.

***Trinema* sp.**  
(Fig. 5L)

MATERIAL EXAMINED. QMF34931.

DESCRIPTION. Single fragmentary specimen, high-spired; suture impressed, whorl face dominated by three prominent spiral cords; whorls embrace at lowermost of these; weak spiral thread on uppermost whorl face. Sinus positioned above the highest thick cord. Growth lines fine and numerous.

REMARKS. The specimen is distinct from *Trinema heideckeri* sp. nov. in that the whorls embrace higher on the whorl face, at the level of the lower of the three major midwhorl cords. Whether this is an aberrant form or a new taxon is unclear.

Superfamily SUBULITOIDEA Lindstrom 1884  
Family SUBULTIDAE Lindstrom 1884

***Subulites* Emmons, 1842**

**?*Subulites* (*Subulites*) sp.**  
(Fig. 5M)

MATERIAL EXAMINED. QMF34934.

DESCRIPTION. Small, high-spired, fusiform shell, 11.3mm high, 4.2mm maximum width, sutures slightly impressed; sutural angle moderate. Whorl profile gently curved. Weak, fine, prosocline, growth lines. Aperture unknown, but shell form suggests presence of anterior notch; inner lip unknown.

REMARKS. Questionable assignment is made on the basis of the general shell form, but it cannot be conclusive without data on the columella and the aperture.

**?*Subulites* (*Fusispira*) sp. A.**  
(Fig. 5N)

MATERIAL EXAMINED. QMF34912.

DESCRIPTION. Fusiform, small, rapidly expanding shell, approximately 4mm high and 2mm wide. Whorls embrace just below periphery which is situated just below midwhorl. Whorl profile smoothly rounded. Growth lines, aperture and inner lip unknown.

REMARKS. Lack of material prevents accurate assignment of this taxon. It differs from the material described below in having no subsutural angulation.

**?*Subulites* (*Fusispira*) sp. B.**  
(Fig. 5O,P)

MATERIAL EXAMINED. QMF35517, QMF35518.

DESCRIPTION. Small, fusiform, maximum height 4mm, width 2.2mm. Whorl profile rounded except for prominent subsutural surface and angulation high on upper whorl face. Sutures impressed, whorls embrace just below periphery which is slightly below the midwhorl.

REMARKS. Inadequate material and poor preservation of lip, ornament and aperture prevents assignment of this material. It differs from ?*Subulites* (*Fusispira*) sp. A. in having a prominent subsutural surface and angulation.

**FAUNAL AFFINITIES**

Presence of species of *Murchisonia*, *Bellerophon* and *Palaeozygopleura*, *Euryzone* and *Anomphalus* demonstrates Old World Realm affinities, but these are at generic level only. It is unclear whether there are links to Chinese and Russian faunas of this age, as they have been so sparingly described, and microgastropods of this age are little-recorded in the literature. There is a general taxonomic continuance with respect to Early Devonian (Emsian) faunas described by Tassell (1982), but this is only on a generic level with the genera represented in both being long-ranging and widespread. Thus there is a strong endemism to the fauna, even when compared to Givetian gastropods from the adjacent Broken River Province (Cook & Camilleri, 1997), with no common species apart from *Burdikinia burdekinensis* and *Labroscuspis nodosa*. This may be a function of the strongly embayed palaeogeographic setting of the Burdekin Subprovince,

in comparison to the open marine conditions of the Broken River Province during the Givetian.

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